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10/729,363

12/05/2003

Fernando Stroppiana

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7590

12/08/2006

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EXAMINER

TORRES VELAZQUEZ, NORCA LIZ

ART UNIT

PAPER NUMBER

1771

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Interview Summary</b>	<b>Application No.</b> 10/729,363	<b>Applicant(s)</b> STROPPIANA, FERNANDO	
	<b>Examiner</b> Norca L. Torres-Velazquez	<b>Art Unit</b> 1771	

All participants (applicant, applicant's representative, PTO personnel):

- (1) Norca L. Torres-Velazquez. (3) \_\_\_\_\_  
 (2) Dave Carlson. (4) \_\_\_\_\_

Date of Interview: 30 November 2006.

Type: a) ☒ Telephonic b) ☐ Video Conference  
 c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
 If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 1.


Identification of prior art discussed: Harkins (4698258); Poteet (4853280); JP '523.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

  
**NORCA TORRES**  
**PRIMARY EXAMINER**

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

\_\_\_\_\_  
 Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent and Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: During the interview, the Examiner provided electronic copies of the English translations of the JP references. Applicant's counsel pointed out that the claimed "distinct areolas" of their invention are different to the "bumps" of the prior art of JP'523 and JP'618 in that the structure shown in the prior art is a continuous layer and the present invention by claiming "distinct areolas" is claiming a non-continuous or separated/individual material as shown in Figure 1 of the application. The Examiner agreed that the claimed "distinct areolas" is different from the material/structure of the prior art of record.

Mr. Callahan further pointed out that element 21 of Fig. 2 of the Poteet reference is different from the claimed "adhesive-absorbing material" and indicated that the invention of Poteet is directed to a carpet material. The Examiner indicated that the presented arguments regarding the Poteet reference will have to be considered on the merits once a written response is sent to the outstanding office action, since the Examiner will have to review the reference on detail in order to address the presented arguments. No agreement was reached as to the allowability of the claims..

10/729,363

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PN=09-100618

CUSHIONING MATERIAL FOR FLOOR, AND FLOORING  
MATERIAL USING THIS CUSHIONING MATERIAL  
[Yuka Yo Kanshozai Oyobi Kore Wo Riyo Shita Yukazai]

Tadaaki Funase, et al.

UNITED STATES PATENT AND TRADEMARK OFFICE  
Washington, D.C. August 2006

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INVENTOR	(72):	FUNASE, TADAAKI; KONDO, OSAMU
APPLICANT	(71):	BRIDGESTONE CORP.
TITLE	(54):	CUSHIONING MATERIAL FOR FLOOR, AND FLOORING MATERIAL USING THIS CUSHIONING MATERIAL
FOREIGN TITLE	[54A]:	YUKA YO KANSHOZAI OYOBI KORE WO RIYO SHITA YUKAZAI

(54) [Title of the Invention]

CUSHIONING MATERIAL FOR FLOOR, AND FLOORING MATERIAL USING THIS  
CUSHIONING MATERIAL

[Claim(s)]

[Claim 1] A cushioning material for a floor which is provided between a floor foundation, such as a concrete slab, and a floor finishing material; said cushioning material for a floor characterized by using a soft material obtained by profiling a foam.

[Claim 2] The cushioning material for a floor of Claim 1 characterized by affixing a nonwoven cloth to one or both sides of the soft material.

[Claim 3] The cushioning material for a floor of Claim 1 or 2 characterized by disposing an elastic granular matter having a higher spring constant than the soft material in the recesses of the profiled uneven face of the soft material.

[Claim 4] A flooring material characterized by affixing the cushioning material for a floor of any one of Claims 1 to 3 to the inferior surface of a floor finishing material.

[Claim 5] A flooring material characterized by separating a floor finishing material into a surface material and a main body portion and affixing the cushioning material for a floor of any one of Claims 1 to 3 therebetween.

[Detailed Specifications]

[0001] [Technical Field of the Invention]

This invention relates to a cushioning material for a floor which is used in a floor structure obtained by directly affixing a floor finishing

material onto a floor foundation, such as a concrete slab, of an apartment house and the like, and a flooring material using it.

[0002] [Prior Art]

With floor structure wherein a floor finishing material, such as a hard wood-based material, on a concrete slab in an apartment house, the material had poor performance for shielding impacts on floors and poor performance for shielding against light impact sources on floors, so improvements were demanded. Therefore, this led to providing a cushioning material for a floor obtained by providing a plastic raw material foam on the inferior surface of the floor finishing material. In order to enhance the shielding performance, the lower the spring constant the better, but if the thickness of the foam increases as a result, the walking feeling is too soft, and subsidence of the floor also becomes a problem. It is desirable for a directly adhering floor to have a hardness to the extent that no subsidence occurs, and also, that it have a performance able to shield the sounds from light impacts on a floor. As shown in Figure 8, a cushioning material for a floor embossed to 2 to 3 mm was developed for this conventional cushioning material for a floor **100** by hot-pressing a 7 mm thick polyurethane foam. The thickness of the hot-pressed cushioning material for a floor **100** is one-third to one-half the thickness of a polyurethane foam before the hot-pressing step.

[0003] [Problems to be Solved by the Invention]

There were inconveniences with a conventional cushioning material for a floor **100** because the manufacturing efficiency diminished and costs rose since it was hot-pressed after subjecting polyurethane to an expansion



molding, the durability declined since heat was applied, and the spring constant could not be reduced when embossing was done skillfully.

[0004] Therefore, it is an object of this invention to provide a cushioning material for a floor which has superior performance for shielding the sounds from impacts on floors simultaneous to having practical hardness while enhancing the production efficiency and planning a decrease in costs.

[0005] [Means for Solving the Problems]

In order to achieve the aforementioned object, this invention is a cushioning material for a floor which is provided between a floor foundation, such as a concrete slab, and a floor finishing material wherein a soft material obtained by profiling a foam is used. Moreover, the flooring material of this invention has a cushioning material for a floor comprising a soft material obtained by profiling foam affixed to the inferior surface of the floor finishing material.

[0006] [Embodiments of the Invention]

A preferred embodiment of this invention will now be described with reference to the drawings.

[0007] In the embodiment shown in Fig. 1, a cushioning material **1** obtained by affixing a very thin nonwoven cloth **3** to both sides of a soft material **2** obtained by profiling a foam, and obtained by subjecting a plastic material, such as a polyurethane, to expansion molding is shown.

A 5 to 10 mm thick soft material can be used ideally for the profiled soft material **2**. The polyurethane is subjected to expansion molding, the thickness of this foam is set to 20 mm, and then it is profiled so that roughness is formed on the surface at positions where the thickness

thereof is halved. A profiled foam with each side cutoff can be used as the soft material **2** so there is no waste of raw material. The protrusions of the soft material **2** in Figure 1 are denoted by **2A** while the recesses are denoted by **2B**.

[0008] Figure 2 illustrates the cushioning material **1** shown in Fig. 1 provided between a floor finishing material **4** and a floor foundation **5**, such as a concrete slab. When a load is applied from above the floor finishing material **4**, the protrusions **2A** become compressed. The spring constant of the protrusions **2A** compressed at the outset is low. When the protrusions **2A** are further compressed from a state where they had been compressed and the form of the recesses **2B** have disappeared, the spring constant of the soft material **2** increases higher than the spring constant when the protrusions **2A** are compressed. The sound of a light impact on a floor is shielded when the protrusions **2A** are compressed. The floor is imparted with practical hardness after the protrusions **2A** have been compressed.

[0009] In Fig. 2, the flooring material is constructed by facing the protrusions **2A** and recesses **2B** of the cushioning material **1** upward and adhering the peak surfaces of the protrusions **2A** as well as the nonwoven cloth **3** to the inferior surface of the floor finishing material **4**. The flooring material also can be constructed by facing the protrusions **2A** and recesses **2B** downward and adhering the even surface of the soft material **2** as well as the nonwoven cloth **3** to the inferior surface of the floor finishing material **4**.

[0010] An example in which the cushioning material **1** in Fig. 3 has the nonwoven cloth **3** provided along the roughness of the protrusions **2A** and the recesses **2B** is shown.

[0011] The cushioning material **1** of Fig. 4 is shown where the protrusions **2A** and the recesses **2B** are present on the top and inferior surfaces by bonding the even surfaces of two pieces of the soft material **2** together. In this example as well, the nonwoven cloth **3** can be provided on either of or on both of the top and bottom sides.

[0012] In another embodiment shown in Fig. 5, an elastic granular matter **6** having a higher elasticity than the soft material **2** disposed on the recesses **2B** of the soft material **2** is shown. In a state in which the granular matter **6** is disposed and no load is applied, the protrusions **2A** of the soft material **2** are situated higher than the granular matter **6**. Scrap rubber chips can be used ideally for the granular matter **6** used here, but a material, such as vinyl chloride, also can be used. This granular matter **6** has a softness to the extent that it is not punctured by the floor finishing material **4** and an elasticity so that it is not damaged from impacts, and the soft material **2** prevents subsidence of the floor when it is compressed. This granular matter **6** is disposed at a rate of 50 g to 500 g per m<sup>2</sup>.

[0013] In the embodiment shown in Fig. 6, the flooring material can be constructed by setting the size of the granular matter **6** to a size where the height is almost the same as that of the protrusions **2A** and adhering the protrusions **2A** and the granular matter **6** to the inferior

surface of the floor finishing material **4**. In addition, the flooring material can be constructed by adhering the surface of the opposite side of the granular matter **6** to the floor finishing material **4**. In either case, the nonwoven cloth **3** can be provided on one or both sides of the soft material **2**. The flooring material can be constructed by affixing the top or inferior surface of the cushioning material **1** shown in Fig. 5 to the inferior surface of the floor finishing material **4**.

[0014] Although the nonwoven cloth **3** in each of the embodiments described above was provided on both sides of the soft material, it can be provided on just one side, and the nonwoven cloth **3** also can be provided. By providing this nonwoven cloth **3**, the adhesive material is prevented from substantially permeating the soft material **2** during adhesion to the floor foundation **5** and to the floor finishing material **4**. In addition, the protrusions **2A** of the soft material **2** were arranged on the floor finishing material **4** side, but by contrast these protrusions **2A** can be arranged on the floor foundation **5** side.

[0015] Figure 7 shows the floor finishing material **4** separated into a surface material **4A** and a main body portion **4B** and the cushioning material **1** inserted therebetween. The cushioning material **1** may not be affixed directly to the floor foundation **5**. Although protrusions **2A** and recesses **2B** are not exhibited on the cushioning material **1** held between the surface material **4A** and the main body portion **4B**, it goes without saying that it can be a soft material **2** obtained by profiling foam, as mentioned above. The flooring material in Fig. 7 is constructed in this state.

[0016] Although a concrete slab was shown for the floor foundation 5, the cushioning material 1 can be provided on a floor substrate constructed in a sleeper joist method. Moreover, another member may be interposed between the floor foundation 5 and the cushioning material 1.

[0017] [Advantages of the Invention]

As described above, a soft material obtained by profiling a foam was used in this invention; hence, simultaneous to the floor having practical hardness, manufacturing costs are decreased and the performance for shielding sounds caused by floor impacts also is outstanding. If such a cushioning material is used, the protrusions subside at the outset from a load applied to the floor, and then the entire floor subsides. The spring constant is low at the outset, and then increases gradually. In particular, the protrusions become compressed for a source of light shocks on the floor, thus preventing propagation of the sounds. After the protrusions become compressed, the spring constant increases while the floor has practical hardness. In addition, while affixing the nonwoven cloth on one or both sides of the soft material, the adhesive is prevented from permeating moderately into the soft material when the cushioning material is adhered to the floor finishing material and the floor foundation using this adhesive. Furthermore, when the elastic granular matter having a higher spring constant than the soft material is disposed in the recesses of the profiled uneven surface of the soft material, the initial spring constant is low which can be increased higher than that thereafter, thus preventing the floor from subsiding.

[Brief Description of the Drawings]

[Figure 1] A cross section showing the cushioning material pertaining to this invention.

[Figure 2] A cross section wherein the cushioning material is provided on the inferior surface of the floor finishing material.

[Figure 3] A cross section of the cushioning material wherein the topside nonwoven cloth was provided along the roughness.

[Figure 4] A cross section of the cushioning material comprised by bonding two pieces of soft material together.

[Figure 5] A cross section showing the soft material combined with the granular matter.

[Figure 6] A cross section of the cushioning material in which the size of the granular material has been changed.

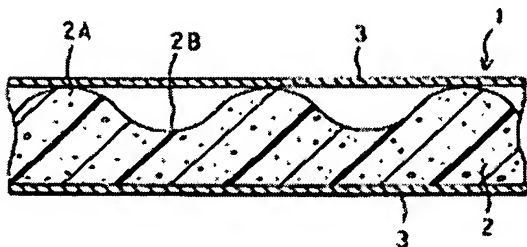
[Figure 7] A cross section which shows the floor material with the cushioning material held therein.

[Figure 8] A cross section showing a conventional example.

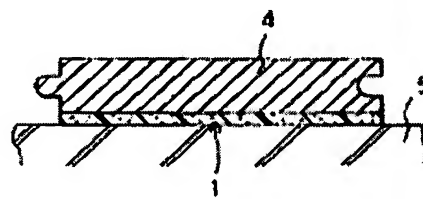
[Explanation of the Codes]

1: cushioning material; 2: soft material; 2A: protrusions; 2B: recesses; 3: nonwoven cloth; 4: floor finishing material; 5: floor foundation; 6: granular matter

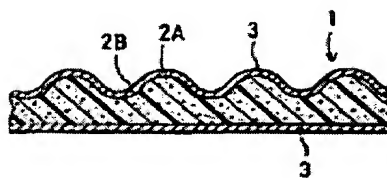
[Figure 1]



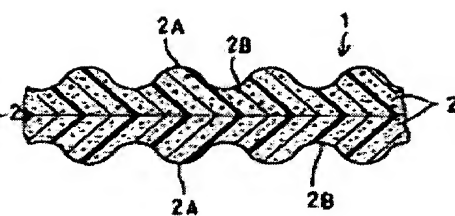
[Figure 2]



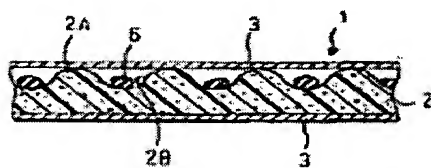
[Figure 3]



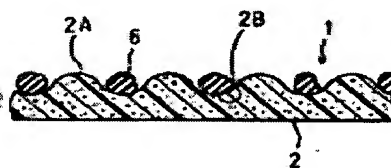
[Figure 4]



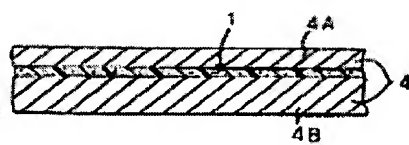
[Figure 5]



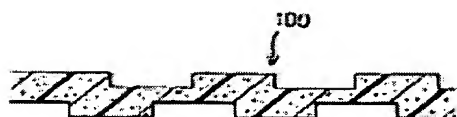
[Figure 6]



[Figure 7]



[Figure 8]



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CUSHIONING MATERIAL FOR FLOOR, AND FLOORING MATERIAL  
EMPLOYING THE CUSHIONING MATERIAL  
[Yuka Yo Kanshozai Oyobi Kore Wo Riyo Shita Yukazai]

Tadaaki Funase, et al.

UNITED STATES PATENT AND TRADEMARK OFFICE  
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INVENTOR	(72):	FUNASE, TADAAKI; KONDO, OSAMU
APPLICANT	(71):	BRIDGESTONE CORP.
TITLE	(54):	CUSHIONING MATERIAL FOR FLOOR, AND FLOORING MATERIAL EMPLOYING THE CUSHIONING MATERIAL
FOREIGN TITLE	[54A]:	YUKA YO KANSHOZAI OYOBI KORE WO RIYO SHITA YUKAZAI

(54) [Title of the Invention]

CUSHIONING MATERIAL FOR FLOOR, AND FLOORING MATERIAL EMPLOYING THE  
CUSHIONING MATERIAL

[Claim(s)]

[Claim 1] A cushioning material for a floor characterized by embedding a granular matter in a layer of a soft material which dampens sounds of impact of a floor.

[Claim 2] The cushioning material for a floor of Claim 1 characterized by forming a permeation-preventing layer for adhesive on one or both sides of the soft material.

[Claim 3] A flooring material characterized by affixing the cushioning material for a floor of Claim 1 or 2 to the inferior surface of a floor finishing material.

[Claim 4] A flooring material characterized by separating a floor finishing material into a surface material and a base material and affixing the cushioning material for a floor of Claim 1 or 2 therebetween.

[Detailed Specifications]

[0001] [Technical Field of the Invention]

This invention is a type of material used for directly affixing a floor finishing material onto a floor foundation, such as concrete slab, for an apartment house, and relates to a cushioning material for a floor provided between a floor finishing material and a floor foundation, and a flooring material using it.

[0002] [Prior Art]

When the floor finishing material was a hard material, such as a wood-based material, when a floor finishing material affixed onto a floor foundation, such as a concrete slab, the material had poor performance for shielding from the source of impacts on the floor, the sounds of walking from, e.g., wearing slippers, the sounds of running children, and the like, from the floor above were transmitted to the floor below. Therefore, a cushioning material for a floor having a urethane foam layer provided between the floor finishing material and the floor foundation was developed. This urethane foam layer is the cushioning material for a floor. As shown in Figure 11, a cushioning material for a floor wherein a 7 mm thick urethane foam having an apparent density of  $35 \text{ kg/m}^3$  was hot-pressed to a thickness of 3 mm is known for this conventional cushioning material for a floor **100**. A floor structure was constructed by bonding a 9 mm thick veneer to one side of this cushioning material for a floor **100** and affixing the other side to the concrete slab.

[0003] [Problems to be Solved by the Invention]

Due to the floor structure using the cushioning material for a floor **100** shown in Figure 11, as a result of testing the impact source of a floor stipulated by the "method for measuring floor impact sound level at an actual structure site" put forth in JIS A 1418, the source was within the sound insulation grade L-55. In addition, the load of a heavy article was applied and the floor subsided.

[0004] Therefore, it is an object of this invention to provide a cushioning material for a floor having outstanding floor impact sound

insulation performance and able to make a practical hard floor by preventing moderate floor subsidence, and a flooring material using it.

[0005] [Means for Solving the Problems]

In order to solve the aforementioned object, the cushioning material for a floor pertaining to this invention has a granular matter embedded in a soft material which dampens sounds of impact of a floor. In addition, the floor material pertaining to this invention has such a cushioning material for a floor affixed to the inferior surface of a floor finishing material.

[0006] [Embodiments of the Invention]

A preferred embodiment of this invention will now be described with reference to the drawings.

[0007] The cushioning material for a floor **1** of this invention shown in Fig. 1 has an abundant amount of embedding granular matter **3** which prevents subsidence of the floor in the layer of a soft material **2** having a thickness and softness satisfactory for damping the sounds of impact of a floor. The soft material **2** comprises two sheets **2A** and **2B**, and the granular matter **3** is inserted between these sheets **2A** and **2B**. In this embodiment, the sheets **2A** and **2B** respectively comprise a 3 mm thick urethane foam having an apparent density of 18 kg/cm<sup>3</sup>. The grain size of the granular matter **3** disposed between the sheets **2A** and **2B** at a ratio of 50 to 500 g/m<sup>2</sup>, preferably, 100 to 200 g/m<sup>2</sup>, and more preferably, 100 g/m<sup>2</sup> is about 1.0 to 2 mm, while rubber chips were used as the granular matter **3**.

[0008] The cushioning material for a floor **1** shown in Fig. 2 is expanded after spreading the granular matter **3** inside a mold for blow molding and

charging the mold with a polyurethane foaming raw material to mold a urethane foam soft material **2**. When the soft material **2** is expanded, the granular matter **3** is present in an embedded state. The cushioning material for making a practical hard floor by preventing moderate subsidence of the floor (soft material in which granular matter is embedded) is preferably one that flexes 0 to 5 mm with respect to a load of 80 kg/50 mm $\phi$ . The (1) raw material, thickness, expansion ratio and spring constant of the soft material and the (2) size, weight, shape and spring constant of the granular material are to be properly selected.

[0009] In the embodiment shown in Fig. 3, the sheet **2A** was molded from a 3 mm thick urethane foam having an apparent density of 18 kg/m<sup>3</sup>, and the sheet **2B** was formed from a 2 mm thick urethane foam having a 20 kg/m<sup>3</sup> apparent density. The same granular matter shown in Fig. 1 was used for the granular matter **3**. Furthermore, in this embodiment, a nonwoven fabric **4** was affixed to the inferior surface of the soft material **2**. A nonwoven fabric having a basis weight of 30 g/m<sup>2</sup> was used for this nonwoven fabric **4**. In this embodiment, the flexion with respect to a load of 80 kg/50 mm $\phi$  was 2.9 mm.

[0010] In the embodiment shown in Fig. 4, the sheet **2A** on the upper side was formed from a 2 mm thick urethane foam having an apparent density of 20 kg/m<sup>3</sup> and the sheet **2B** on the lower side was formed from a 3 mm thick urethane foam having an apparent density of 18 kg/m<sup>3</sup>. The nonwoven fabric **4** was adhered to the surface of the upper sheet **2A**. In this embodiment, the flexion with respect to a load of 80 kg/50  $\phi$  was 2.9 mm.

[0011] Although urethane foam was illustrated for the soft material **2**, a polyester foam or other synthetic resin material foam, a rubber foam, a synthetic resin material, such as polyester, rubber, nonwoven cloth, and knit fabric are included therefor. This soft material **2** layer should have a thickness and softness satisfactory for dampening sounds of impact of a floor. In addition, although an example in which rubber chips were used was illustrated for the granular matter **3**, it may be made of vinyl chloride. When a load is applied to the floor finishing material, this granular matter **3** is elastic, allowing it to bite into the floor finishing material, and when the impact increases, the floor finishing material does not break. In addition, various shapes can be used for that of this granular matter **3**, which may be substantially granular, polygonal or rod-shaped. Furthermore, the nonwoven fabric **4** can be affixed to both sides of the soft material **2** layer. An adhesive may be used in this affixing step. The surface of the soft material **2** is melted and affixed thereon. When the soft material **2** layer is adhered to the floor finishing material and the floor foundation as this nonwoven fabric **4** is affixed thereon, an adhesive subsidence-preventing layer which functions in preventing the adhesive from permeating substantially into the soft material **2** is formed. When the surface is melted, subsidence of the adhesive on the melted face is prevented. A film, such as a polyethylene, polyethylene or polyester film, can be affixed to the soft material **2** in place of the nonwoven fabric **4**. The film may be a polyethylene, polystyrene or polyurethane thin foam material, or a vinyl chloride film or sheet. These

adhesives prevent subsidence in the soft material **2**, and prevent the softness of the soft material **2** from being impaired. Still further, the position where the granular matter **3** is embedded in the layer of soft material **2** does not need to be at a level substantially midway to the soft material **2** layer. It may be a position near the topside or the underside. It is not necessary that the granular matter **3** be disposed horizontally at the same level. The granular matter **3** is embedded in the soft material **2** in a half-sunken state, and it may protrude partially from the surface. As shown in the embodiment, due to a structure in which the granular matter **3** is held between the two sheets **2A** and **2B**, the position at which the granular matter **3** is embedded can be set in accordance with the softness of the sheets **2A** and **2B** (when the hardness of the two sheets **2A** and **2B** differ).

[0012] Figure 5 shows this cushioning material for a floor **1** provided between a floor finishing material **10** and a floor foundation **11**. The flooring material is composed by affixing the aforementioned cushioning material for a floor **1** to the inferior surface of the floor finishing material **10**. This floor finishing material **10** comprises a wood-based material which is then subjected to an actual machining.

[0013] Figure 5 depicts a floor material composed by separating the floor finishing material **10** into a surface material **10A** and a base material **10B** and inserting this cushioning material for a floor **1** between the surface material **10A** and the base material **10B** and affixing it.

[0014] For the flooring material shown in Fig. 7, protrusions **21B** and recesses **22B** are formed by bonding the soft material **2** affixed to the inferior surface of the floor finishing material **10** and the sheets **2A** and **2B**, providing the granular matter **3** therebetween, and profiling the sheet **2B**. In this embodiment, if a weight is applied to the floor finishing material **10**, the protrusions **21B** are compressed initially, then the soft material **2** is compressed, and lastly, the granular matter **3** is compressed and hardens gradually. Sounds of impact of a floor are shielded ~~X~~ by the compression of the protrusion **21B**. Moreover, the protrusions **21B** and the recesses **22B** may be affixed to the inferior surface of the floor finishing material **10**. Furthermore, the two sheets **2A** and **2B** are profiled, respectively.

[0015] Figure 8 shows a situation in which the granular matter **3** in the soft material **2** is dispersed perpendicularly, and as a matter of course, such a cushioning material for a floor **1** also can be used, and it can be used as the flooring material by affixing it to the inferior surface of the floor finishing material **10**.

[0016] Figure 9 depicts numerous grooves **10A** formed on the inferior surface side of the floor finishing material **10**, which are formed to a depth of about 4 to 6 mm and at a pitch of about 12 to 30 mm in the longitudinal direction, cross direction, or in each of these directions. The cushioning material for a floor **1** is affixed to this groove **10A** side, as mentioned above.



[0017] The graph shown in Fig. 10 illustrates the measurement results at the floor cushioning sound level on the basis of JIS A 1418. The curve denoted by the reference symbol **A** in the graph is the conventional example shown in Fig. 11, while the curve denoted by the reference symbol **B** illustrates that the cushioning material for a floor **1** shown in Fig. 3 is used at the same conditions as in the conventional example. In the embodiment of this invention (see reference symbol **B**), the sound insulation grade is about L-54. At L-55, sounds are likely to cause slight anxiety, at L-50, sounds, such as foot steps, running-around sounds, and the like are not likely to cause any anxiety at all, and at L-45, foot steps and the like can be heard but are not likely to cause anxiety. According to the present application, the floor impact sound insulation performance is outstanding, as seen from these measurement results.

[0018] In addition, the results upon measuring the subsidence of the floor are such that if the weight of a heavy article is applied to the floor of a conventional product, considerable subsidence was observed, while much less subsidence occurred with the product of the embodiment of this invention than the conventional product. The hardness of the floor also is practical and the walking feeling is good.

[0019] [Advantages of the Invention]

As described above, according to this invention, the granular matter is embedded in the soft material layer which insulates sounds of impact of a floor; hence, the layer of soft material reduces this impact with respect to an impact from an impact source of a floor and also prevents propagation of sounds. Furthermore, as the soft material subsides, the

elastic granular matter hits the inferior surface of the floor finishing material, and warping of the layer of soft material is prevented. The warping in this invention is about 0.8 times that of the cushioning material of the conventional product.

[0020] In addition, when the cushioning material had a flexion of 0 to 5 mm for a load of 80 kg/50 $\phi$ , a floor having practical hardness could be made by preventing moderate subsidence of the floor.

[0021] In addition, by having a subsidence-preventing layer of adhesive on one or both sides of the layer of the soft material, while bonding the floor finishing material and floor foundation together, this subsidence-preventing layer prevents the adhesive from permeating into the layer of soft material, and the function of the soft material for cushioning sounds of impact of a floor is not impaired.

[0022] Furthermore, when the soft material is selected from a synthetic resin material, rubber foam, synthetic resin material, rubber, nonwoven cloth or woven fabric and the granular material is selected from rubber or a synthetic resin material, the optimum spring constant and the like can be set with ease, depending on the composition, expansion ratio, and the like of these materials. In particular, if rubber chips are used as the granular matter, recycled products can be used; hence, a wide-scale decrease can be planned.

[0023] Still further, in this invention, even if the overall thickness is reduced, the part with the soft material primarily received and held the cushioning of the sound of impact of a floor, while the granular matter lessened the overall warping and improved rigidity; hence, an improvement

in the floor impact sound shielding performance is resurrected, the floor is prevented from subsiding, and also, a floor having practical hardness is provided.

[Brief Description of the Drawings]

[Figure 1] A cross section showing a preferred embodiment of this invention.

[Figure 2] A cross section showing an example in which the granular matter is embedded while molding the soft material.

[Figure 3] A cross section showing another embodiment.

[Figure 4] A cross section showing yet another embodiment.

[Figure 5] A cross section showing an example in which the cushioning material for a floor of this invention is provided between the floor finishing material and the floor foundation.

[Figure 6] A cross section showing an example in which a cushioning material for a floor is provided between finishing materials.

[Figure 7] A cross section showing another flooring material.

[Figure 8] A cross section showing an example in which multiple layers of the granular matter are embedded.

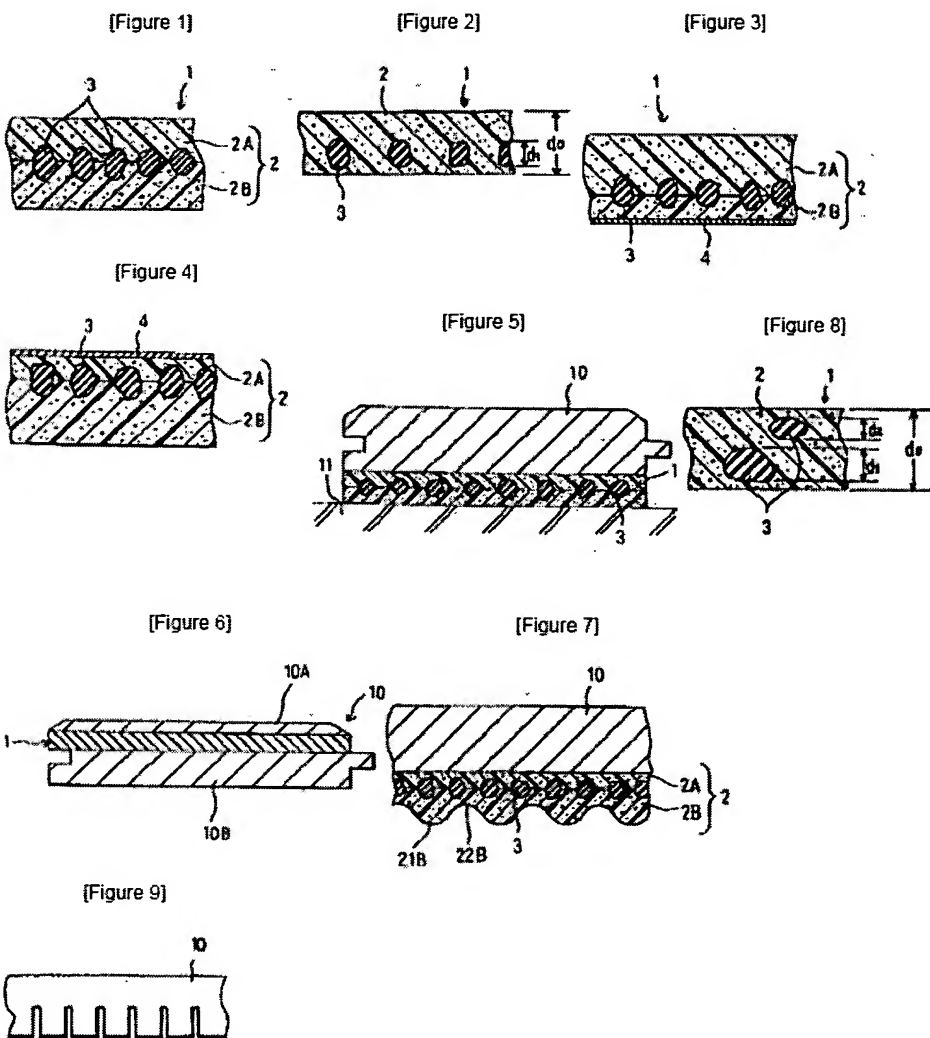
[Figure 9] A front elevation showing another example of the floor finishing material.

[Figure 10] A graph showing the measurement results of a floor impact sound test.

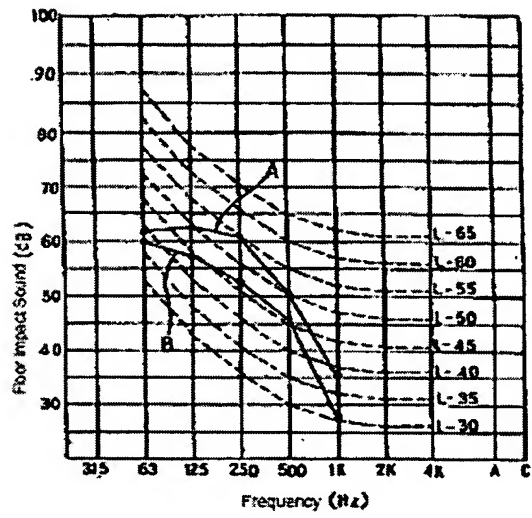
[Figure 11] Cross section showing a conventional example.

[Explanation of the Codes]

1: cushioning material for a floor; 2: soft material; 3: granular matter; 10: floor finishing material



[Figure 10]



[Figure 11]

